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(54) AUTOMATIC DRIVER MODELING FOR INTEGRATION OF HUMAN-CONTROLLED VEHICLES INTO AN AUTONOMOUS VEHICLE NETWORK

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(58) Field of Classification Search

(56) References Cited

U.S. PATENT DOCUMENTS

	6,505,780	B1	1/2003	Yassin et al.
	6,720,920	B2	4/2004	Breed et al.
	6,728,605	B2	4/2004	Lash et al.
	7,202,776	B2	4/2007	Breed
	7,389,178	B2	6/2008	Raz et al.
	7,961,906	B2	6/2011	Ruedin
	8,078,349	B1*	12/2011	Prada Gomez et al 701/23
	8,520,695	B1*	8/2013	Rubin et al 370/445
	2008/0262670	A1	10/2008	McClellan et al.
	2009/0192705	A1	7/2009	Golding et al.
	2011/0010023	A1	1/2011	Kunzig et al.
	2011/0021234	A1*	1/2011	Tibbitts H04W 48/04
				455/517
	2011/0301786	A1*	12/2011	Allis G05D 1/0038
				701/2
	2012/0083960	A1	4/2012	Zhu et al.
(Continued)				
(Continued)				

OTHER PUBLICATIONS

Ehlert et al. ("Microscopic traffic simulation with reactive driving agents", IEEE, 2001, pp. 861-866).*

(Continued)

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(57) ABSTRACT

Automatic driver modeling is used to integrate human-controlled vehicles into an autonomous vehicle network. A driver of a human-controlled vehicle is identified based on behavior patterns of the driver measured by one or more sensors of an autonomous vehicle. A model of the driver is generated based on the behavior patterns of the driver measured by the one or more sensors of the autonomous vehicle. Previously stored behavior patterns of the driver are then retrieved from a database to augment the model of the driver. The model of the driver is then transmitted from the autonomous vehicle to nearby vehicles with autonomous interfaces.

12 Claims, 4 Drawing Sheets

